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## Article

# Environmental Innovation and Firm Performance: How Firm Size and Motives Matter

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**Abstract:** There is limited understanding of the precise circumstances under which environmental actions—such as environmental innovation—contribute to firm performance. Building on the resource-based view and on stakeholder theory, this study argues that the general positive effect of environmental innovation on financial performance varies significantly with firm size and the motives underlying a firm's engagement in environmental innovation. Integrating survey data and lagged annual account data on 1761 Flemish companies, we find that larger firms benefit financially from environmental innovation driven by regulation or industry codes of conduct, while smaller firms benefit from environmental innovation introduced in response to customer demand. While it is increasingly accepted that environmental innovation relates positively with firm performance, the current study highlights important boundary conditions of this relationship.

**Keywords:** firm size; environmental innovation; firm performance; motives

## 1. Introduction

There are growing concerns about climate change and sustainable development. The private sector, i.e., firms, could play an important role to help work toward 'greener societies' as it is typically regarded to be particularly good at innovating. To engage more firms in environmental innovation activities—and possibly design policies that support them—it is important to understand when and why firms' environmental innovation impacts their performance. Although evidence exists that firms' environmental engagement can have a positive impact on their performance [1], firms differ significantly in terms of their environmental activities. In particular, smaller firms are typically less prone to engage in environmental actions than large firms. In addition, past research suggests that while smaller firms usually engage in environmental innovation in order to comply with regulation [2–5], only small firms that undertake proactive, voluntary environmental innovation appear to benefit financially from their environmental innovations [6]. If we assume that firms are rational in their adoption of environmental practices, these findings suggest—in line with recent statements on innovation in general [7]—that not all companies benefit to the same extent from environmental innovation. In particular, they point to innovation motives and firm size as potential moderators of the relationship between environmental innovation and firm performance.

In this study, we follow existing work and argue that environmental innovations generally lead to improved financial performance, as they allow firms to reduce waste disposal and raw material cost, increase product value and firm competitiveness, reduce public and community pressure, and even help shape future regulations which raise competitors' relative costs. Using insights from the resource-based view [8,9], we then argue that the strength of this general relationship depends on firm size. We propose that smaller firms are less equipped than larger firms to engage in environmental practices with long

term strategic benefits, implying that their environmental innovations will be less effective in improving financial performance. Finally, we refine these propositions further by arguing that this moderating effect of firm size depends on the motives, i.e., the reasons ‘why’ firms engage in environmental innovation. We propose that smaller firms reap fewer financial benefits from regulation-driven environmental innovation, as these force them to develop less effective environmental innovations at a higher cost of capital than is the case for larger firms [10,11]. However, we propose that smaller firms benefit more from voluntary environmental innovations introduced in response to customer demand, as relationships with external stakeholders are known to be more important for smaller than for larger firms [12,13].

A core contribution of the current study is that it jointly considers firm size, regulatory motives, and voluntary motives as potential moderators of the relationship between environmental innovation and financial performance. In doing so, our findings offer new insight and enhance our understanding of the conditions under which firms’ engagement in environmental innovation enhances their performance. Our study overcomes the limitations of many former studies that investigated the financial implications of either voluntary or regulation-induced environmental innovations, but did not include or compare these distinct effects in one single analysis, leading to possible omitted variable bias [14,15]. Analyzing survey data and lagged independent annual account data on 1761 Flemish firms confirms that environmental innovations driven by customer demand are more beneficial for smaller firms than for larger firms. Larger firms on the other hand, benefit significantly more than smaller firms from environmental innovations introduced in response to government regulation or industry codes of conduct. Environmental innovations triggered by the availability of subsidies are not related to financial firm performance independent of firm size. While it is increasingly accepted that environmental innovation relates positively with firm financial performance, this study highlights important boundary conditions of this relationship. It also speaks to the more general recent debate on when innovation activities ‘pay off’ which challenges the widely held but inaccurate assumption that any innovation enhances firm performance [7]. Our study has important implications for practitioners and policy-makers including, for example, that subsidies do not appear to be effective in incentivizing performance-enhancing environmental innovations.

Overall, this study confirms that one cannot simply transfer insights on environmental activities from a large firm perspective to a small- and medium-sized enterprise (SME) context [16], as SMEs are known to differ in terms of management practices, resources, and organizational capabilities [6,17]. Previous work suggests that policy makers can reduce the cost of environmental regulation for SMEs (i.e., ‘compliance asymmetries’) by imposing less stringent regulatory requirements on small businesses (i.e., ‘statutory asymmetries’) and by enforcing environmental regulation especially in larger firms (i.e., ‘enforcement asymmetries’) [18]. This paper goes one step further, and explores whether instead of reducing the cost of environmental regulation, it is preferable to use other policy measures for promoting environmental practices in SMEs without endangering their financial performance. As such, it answers the call to study the different drivers or motives of firms’ environmental behavior, which form an under-researched field of study, particularly in the context of SMEs [19].

## 2. Literature Background

For almost three decades, governments and pressure groups around the world have been promoting the concept of ‘sustainable development’, which implies balancing economic development and improvement in environmental performance. An important way of improving environmental performance is through environmental innovations [20,21], which can be defined as new or improved technologies, products, processes, or organizational forms that are beneficial to the environment as they reduce or avoid negative environmental impacts [22].

Although the concept of sustainable development is well-established and evidence exists that firms’ environmental engagement can constitute a competitive advantage and thereby positively impact their performance [1], firms differ significantly in their environmental innovation strategies [23].

In particular, SMEs are typically much less likely than large firms to engage in voluntary environmental innovation [2,3,24] and point to regulation as the most important reason for adopting environmental improvement programs [4,5]. If we assume that firms are rational in their adoption of environmental practices, this suggests that the size of a company and its motives for undertaking environmental activities are potential moderators of the relationship between environmental innovation and firm performance.

### *2.1. The General Effect of Environmental Innovation on Firm's Financial Performance*

How environmental innovation is related to a firm's financial performance, is a long-debated question. Economists traditionally saw a trade-off between environmental sustainability and firms' performance. Expenditures for environmental innovation were expected to divert management attention, increase labor and capital costs, and crowd out other, more productive investments [25,26]. In the past two decades however, the idea has progressed that environmental activities can produce a win-win situation for both the environment and the company [27–31]. By developing environmental innovations, companies can (a) increase product value and firm competitiveness due to improved technical efficiency, improved reputation and customer demand for environmentally-friendly products or services, (b) diminish waste disposal and raw materials cost, (c) reduce public and community pressure, and (d) even help shape future regulations which in turn raise competitors' relative costs [32–35]. These benefits are believed to outweigh the costs for environmental innovation. According to the natural-resource-based view of the firm, "it is likely that strategy and competitive advantage in the coming years will be rooted in capabilities that facilitate environmentally sustainable economic activity" (Hart, 1995, p. 991, [30]). Empirical evidence confirms this general positive relationship between firms' environmental engagement and their financial performance [1], and environmental innovation is now generally believed to positively influence firm performance. As a baseline hypothesis, we therefore propose that:

**Proposition 1.** *In general, firms reap financial benefits from environmental innovation.*

### *2.2. Firm Size and the Effect of Environmental Innovation*

Whereas in general, firms are expected to benefit financially from environmental innovation, we do not expect this relationship to be equally strong under all circumstances. According to the resource-based view of the firm [8,9], successful innovation in general, and successful environmental innovation in particular, is heavily dependent on a firm's resources and capabilities [36]. Although, due to their entrepreneurial orientation and internal interaction, some small firms are very flexible and can react quickly and even proactively to environmental pressures [6,37,38], many of them do not have the necessary organizational practices and resource configurations to deal with the broad scope and multi-dimensional character of environmental innovation [39,40]. Inhibiting factors are undercapitalization, having few employees, and owner-managers lacking the managerial skills needed to implement practices outside of their core technical expertise [16,41]. As Khanna (2001, p. 310, [32]) explains, "Larger firms may experience lower marginal costs of abatement due to scale economies and have more personnel to meet the administrative and technical requirements." Whereas smaller firms may be quicker and more flexible in implementing ad-hoc, small-scale problem solving such as emission reduction, they are less equipped to engage in broader environmental practices with long term strategic benefits such as pollution prevention [42]. This implies that their environmental innovations will be less effective for reducing waste disposal and material cost, and for increasing product value and firm competitiveness due to improved technical efficiency, i.e., for obtaining some of the intermediary outputs that—as explained in Section 2.1—lead to improved financial performance. In general, the resource-based view would hence suggest that environmental innovation has fewer financial benefits for smaller firms than for their larger counterparts.

**Proposition 2.** *In general, smaller firms reap fewer financial benefits from environmental innovation than their larger counterparts.*

However, this paper argues that the above relationship does not hold for all types of environmental innovations. Firms have different motives for engaging in environmental innovation [43–45] and these motives may relate to whether firms of different sizes reap financial benefits from environmental innovation, as we explain next.

### *2.3. Firm Size and Voluntary versus Regulation-Driven Environmental Innovation*

As mentioned above, firms vary significantly in their engagement in environmental innovation. While some proactively modify current products, processes and management system or develop new ones to improve their environmental performance, others merely do so when forced by legal and regulatory requirements [23,46]. A considerable number of studies investigate motives or drivers of environmental innovation [43,44], but do not explore whether these different motives may have different consequences for subsequent firm financial performance. Conversely, studies that investigate environmental innovation in relation to firm performance focus on either voluntary or regulation-induced environmental innovations, but do not consider both types of motives for environmental innovation together [14,15]. For instance, many studies investigate the effect of environmental regulation without controlling for the fact that a firm's environmental innovation may be the result of a change in customer demand and not of the environmental regulation following these changes in demand [15]. The danger of such omitted variable bias is a significant misconception of the relative importance of regulation and voluntary, demand-induced environmental innovation for firm financial performance—and in consequence potentially ineffective firm-focused policies to mitigate climate change and stimulate sustainable development.

In order to avoid possible omitted variable bias, this study investigates multiple motives for environmental innovation, including both regulation-driven and different types of voluntarily motivations for environmental innovation (cfr. [45]). Previous work that takes both regulation-driven and voluntary motivations into account finds that environmental innovations introduced because of regulation on average have a positive effect on firm profitability, while voluntary environmental innovations on average do not have a significant effect [45]. Extending this work, in this study, we argue that these effects may critically depend on firm size, and in particular on the differences in the resource endowments of smaller vs. larger firms.

Smaller firms typically point to regulation as the most important reason for adopting environmental improvement programs [4,5]. Under regulatory pressure, smaller firms will be forced to introduce environmental innovations just like their larger counterparts, even if they lack the necessary resources to successfully do so and are not able to develop equally effective environmental innovations, as explained above. Moreover, these regulation-induced innovations also come at a cost. Previous work [8] shows that pollution abatement operating costs (PAOC) per unit of economic activity decreases with firm size, and seemingly concludes that SMEs suffer less from environmental regulation than large firms. However, operating costs are not the only factor determining financial performance. Several studies have demonstrated that when additional resources and investments are needed to comply with environmental regulations, this will typically increase SMEs' cost of obtaining capital [10,11]. Smaller firms typically rely on relatively short-term debt in order to finance their operations. Larger firms generally have lower debt/equity ratios and can acquire additional capital under better terms. As a result, environmental regulation and the resulting need for additional resources imposes a larger cost burden on smaller firms than on larger firms. Moreover, larger firms can also pass along their capital cost increase over a larger volume of goods or services sold [10,11]. Environmental regulation hence forces smaller firms to develop not only less effective environmental innovations than larger firms, but also implies that this development induces a higher cost of capital than is the case for larger firms. We therefore hypothesize that:

**Proposition 3.** *Smaller firms reap fewer financial performance benefits from regulation-driven environmental innovation than their larger counterparts.*

The story is somewhat more nuanced when it comes to voluntary environmental innovation activities. These are “... *organizational commitments towards improving the natural environment [ ... ] not required by law*” (Darnall et al., 2010, p. 1072, [47]). On the one hand, some authors have argued that large firms may directly and indirectly reap more benefits from voluntary environmental innovations than small firms. Firstly, they have a larger customer base from which they can experience an increased demand for environmentally friendly products or services. In addition, secondly, because of their higher visibility, their environmental activities have a greater impact on future environmental regulations, which in turn improves their the long term performance [32].

However, others have argued that small firms may in fact benefit more from voluntary environmental activities than their large counterparts, because their financial wellbeing and survival is especially dependent on the quality of their stakeholder relations. According to stakeholder theory, better management of a firm’s relationship with its stakeholders leads to improved financial performance [48,49], also in the context of environmental innovation. As explained by Darnall et al. (2010), “*stakeholders can pressure firms to adopt proactive environmental practices that improve their environmental performance. This improved financial performance can increase organizations’ internal efficiency and external legitimacy, which, in turn, can lead to competitive advantage and wealth creation*” (Darnall et al., 2010, p. 1072, [47]). It has been shown that small firms’ success is even more dependent on reputation and on the approval of local stakeholders than is the case for large firms [12,13]. The benefits of satisficing stakeholders by engaging proactively in environmental innovation may therefore compensate for small firms’ resource disadvantages. In sum, the improvement in reputation, the increase in customer demand, and the reduction in public and community pressure that—as explained in Section 2.1—follow from environmental innovation, and will lead to a more pronounced improvement in financial performance in smaller firms than in larger firms. Building on stakeholder theory, we therefore hypothesize that:

**Proposition 4.** *Smaller firms reap greater financial performance benefits from voluntary environmental innovation than their larger counterparts.*

### 3. Materials and Methods

#### 3.1. Sample

In 2009, we surveyed a random sample of 4901 Flemish companies (stratified by sector and size) with respect to the environmental innovations they had developed in the period 2006–2008. The survey was part of the European Union Community Innovation Survey, but included additional questions for research purposes. The 4901 firms—including private and publicly listed companies—were selected from a broad range of manufacturing and service industries (see Appendix A) and from different size classes. After two reminders by regular mail and an intense telephone follow-up, we obtained response rate of 45% (2202 firms). We merged this survey data to information on the firms’ financial performance, obtained from BELFIRST. Each year, the majority of Belgian firms (including the Flemish firms) are legally required to submit their annual accounts to the Central Balance Sheet Office in order to provide third parties with reliable information on their financial situation, employment and development. These data are then added to the BELFIRST database, an electronic database containing financial information on Belgian companies and businesses. Upon merging our sample of 2202 firms and removing outliers as well as missing values on the variables that we constructed, we obtained a final sample of 1761 firms (this final sample was characterized by, on average, larger firm size than the initial sample of 2202 firms, as small firms are legally allowed to submit abbreviated annual accounts, leading to more missing values for financial performance than is the case for larger firms).



### 3.2. Measures and Descriptive Statistics

**Firm performance.** In order to assess the financial performance implications of environmental innovation, we used value added for 2008 (expressed in thousand euro), and divided this by the number of employees in 2008. Value added was obtained from the firms' annual accounts (taken from the BELFIRST database). It is defined as sales income less materials and services purchased [50] and reflects the wealth created by the use of a firm's resources before its allocation to shareholders, debtholders, employees, and the government [50]. Value added is a highly appropriate alternative to sales or profits [51]. Firstly, whereas all Belgian firms are required to provide value added, only the larger ones are obliged to report sales figures. Using sales per employee as a dependent variable would therefore imply selecting only the larger firms, and we are equally interested in their smaller counterparts. Secondly, while sales are generally considered less industry dependent compared to other growth indicators such as employment or total assets [52], "*value added is probably even more suitable than sales as it also incorporates the value of the bought-in materials and services needed to produce a specific output which are industry dependent as well*" (Vanacker et al., 2011, pp.688, [51]). Finally, and in line with [51], we did not use net income or net worth because variability in the tax treatment of income in private firms is likely to reduce the reliability of these performance estimates.

The average net added value in 2008 for the firms in our sample was 11,422 thousand euro. Due to skewedness, we calculated the natural logarithm of the net added value for 2008 (firms with a zero or negative net added value for 2008 were considered outliers and were removed from the sample). We labeled this variable *Ln\_NAV08* and included it as the dependent variable in our regressions.

**Environmental innovations.** We surveyed firms about their voluntary as well as their regulation-induced environmental innovations. In line with the definition of environmental innovations [22], we asked the firms whether they had introduced in the period 2006–2008 any product, process, organizational, or marketing innovation that had resulted in environmental benefits—either for the firm itself—such as (a) reduced material usage per unit of output, (b) reduced energy usage per unit of output, (c) lower CO<sub>2</sub> footprint of the firm, (d) substitution of materials by less polluting or less dangerous alternatives, (e) decreased soil, water, air, or noise pollution, or (f) recycling of materials, waste, or water—or for the users of the innovation—such as (g) lower energy usage, (h) decreased soil, water, air, or noise pollution, or (i) better recycling of products after use. The resulting dummy variable *Environmental innovation* receives the value one if the firm had introduced an innovation with at least one of these environmental benefits; and zero otherwise. About 32% of the firms in our sample had introduced an environmental innovation in the period 2006–2008 (see Table 1).

**Motives.** If a firm indicated that it had indeed introduced an environmental innovation in the period 2006–2008, we asked whether or not it had at the time introduced this innovation as a response to (1) contemporary environmental regulation or taxes, (2) then expected future environmental regulation or taxes, or (3) a then existing or expected future customer demand for environmental innovations. While the former two represent regulation-driven environmental innovation, the latter clearly represents voluntary environmental innovation. Although we did not propose specific effects for other drives of environmental innovation, we also included and controlled for further motives. In particular, we also included as potential motives (4) the contemporary availability of subsidies or other public financial incentives for environmental innovation, and (5) contemporary industry codes of conduct or agreements to stimulate environmental responsibility in their industry [53,54]. Respondents were not forced to choose between these five options; but could indicate multiple motives.

**Table 1.** Descriptive statistics (1761 observations).

	Mean	Std. Dev.	Correlations								
			Ln_NAV08	Environmental Innovation	Regulation	Subsidy	Demand	Codes	Ln_Size	Ln_Age	Ln_RDint
Ln_NAV08	8.024	1.36	1								
Environmental innovation	0.323	0.47	0.27	1							
Regulation	0.213	0.41	0.27	0.75	1						
Subsidy	0.085	0.28	0.18	0.44	0.36	1					
Demand	0.114	0.32	0.16	0.52	0.35	0.28	1				
Codes	0.201	0.40	0.22	0.73	0.50	0.31	0.41	1			
Ln_Size	3.741	1.22	0.90	0.26	0.27	0.17	0.14	0.20	1		
Ln_Age	3.185	0.77	0.15	0.04	0.05	0.06	0.03	0.03	0.22	1	
RDint	0.002	0.17	0.01	0.06	0.07	−0.01	0.08	0.03	0.02	−0.09	1



Given the high correlation between the answers to the first two items (0.63), we grouped them into one dummy variable *Regulation*, indicating whether the firm had introduced in the period 2006–2008 any eco-innovation because of current or future regulations or taxes. The dummy variable *Demand* indicates whether the firm had introduced in the period 2006–2008 any eco-innovation in response to customer demand. The dummy variable *Subsidy* indicates whether or not the firm had introduced in the period 2006–2008 any eco-innovation because of the availability of public financial incentives, while *Codes* indicates whether or not the firm had introduced in the period 2006–2008 any eco-innovation to comply with codes of conduct in its industry.

Table 1 provides descriptive statistics for these variables. As mentioned earlier, 32% of the firms in our sample introduced an environmental innovation in the period 2006–2008. About 21% did so because of current or future regulations, 11% in response to customer demand, 8% because of the availability of public financial incentives, and 20% to comply with codes of conduct in its industry. The sum of these separate percentages for the different motives is larger than 32%, as firms could indicate multiple motives for environmental innovation.

**Firm size.** Performance is likely to be influenced by size effects, with smaller firms suffering from ‘liabilities of smallness’ [55–57]. As such, we do not only hypothesize a moderating effect of firm size on the relationship between environmental innovation and firm performance, but we also expect a direct effect of size on firm performance. The average firm in our sample has 122 employees. As the distribution of the number of employees is highly skewed, we took the natural logarithm to construct the variable *Ln\_Size*.

**Control variables.** To isolate the impact of environmental innovations on financial performance, it is important to control for other factors that could also have influenced performance [32]. We introduced several variables to control for possible confounding effects: firm age, R&D intensity, and sector characteristics.

Complementary to the liability of smallness, the liability of newness is often identified as a threat to firm performance [58]. We therefore included the age of the firm in our regressions. The firms in our sample are between 1 and 262 years old; the average firm being 32 years old. In order to account for skewedness, we took the natural logarithm of the age of the firm and labeled it *Ln\_Age*.

When studying the relationship between environmental innovation and firm performance, one needs to exclude the possibility that environmental innovation is merely reflecting the firm’s technological capabilities [59,60]. In order to avoid this problem, we incorporated the firm’s R&D intensity as a factor that influences firm’s financial performance. Each firm was asked how much it spent on internal R&D in 2006. We divided these expenditures by the turnover in 2006 (from the annual accounts) and labeled this variable *RDint*. The average firm in our sample spends 0.2% of its turnover on internal R&D (see Table 1).

Finally, we controlled for sector effects. In the survey, companies were asked to provide their main NACE code (the companies were actually sampled based on their NACE code and number of employees, but were given the opportunity to correct their main NACE code on the questionnaire form). NACE, which is short for “Nomenclature générale des Activités économiques dans les Communautés Européennes,” refers to the industrial classification used by Eurostat and is the subject of legislation at the European Union level, which imposes the use of the classification uniformly within all the Member States. We aggregated these NACE codes into 13 broad sectors and included sector dummies in our analyses. Appendix A contains a description of these 13 sectors and provides the number of companies active in each of them.

## 4. Results

### 4.1. Main Results

We ran regression models with robust standard errors. In a first step, we regressed financial performance (*Ln\_NAV08*) on the dummy variable Environmental innovation. As shown in Table 2,

we find that engaging in environmental innovation overall is positively associated with firm financial performance, in line with our baseline Proposition 1 (Table 2, Model 1). However, there is a strong positive moderating effect of firm size (Table 2, Model 2) indicating that larger firms reap significantly more financial benefits from environmental innovation than smaller firms. This is in line with Proposition 2. We now perform more detailed analyses and examine the effects of different motives for engaging in environmental innovation.

**Table 2.** Regression results: environmental innovation and firm financial performance ( $Ln\_NAV08$ ) (1761 observations).

	<b>Model 1</b>	<b>Model 2</b>
<i>Environmental innovation</i>	0.1198 *** (0.0297)	−0.1770 * (0.1105)
<i>Ln_Size</i>	1.0064 *** (0.0141)	0.9729 *** (0.0213)
<i>Environmental innovation * Ln_Size</i>		0.0763 *** (0.0277)
<i>Ln_Age</i>	−0.0614 *** (0.0205)	−0.0592 *** (0.0203)
<i>RDint</i>	−1.9105 (2.1377)	−1.9681 (2.1447)
<i>Industry dummies</i>	Included ***	Included ***
$R^2$	0.8292	0.8302

\*  $p < 0.10$ ; \*\*\*  $p < 0.01$ . Robust standard errors in parentheses.

Table 3 shows the regression of financial performance on the different motives. When looking at our basic regression model without interaction effects (Table 3, Model 1), we find that of the four motives for engaging in environmental innovation, only Subsidy has a significant and positive effect on  $Ln\_NAV08$ . At first sight, environmental innovations introduced as a reaction to the availability of subsidies hence appear to have a positive effect on firms' financial performance.

The results become more differentiated when interaction effects for firm size are taken into account (Table 3, Model 2). Although the main effect of Regulation remains insignificant, we find that Regulation \*  $Ln\_Size$  has a significant positive effect on  $Ln\_NAV08$ . This is in line with our Proposition 3 that larger firms reap greater benefits from environmental innovation introduced in response to regulation. We find a significant positive effect of Demand as well as a significant negative effect of Demand \*  $Ln\_Size$  on  $Ln\_NAV08$ . Thus, our Proposition 4 is confirmed, as smaller firms reap greater financial performance benefits from voluntary environmental innovations that have been introduced as a reaction to customer demand than their larger counterparts. With regard to other motives that we included in the regression to avoid omitted variable bias but for which we did not predict different effects by firm size, we see that Codes \*  $Ln\_Size$  has a significant positive effect on  $Ln\_NAV08$ , while the main effect of Codes remains insignificant. We find no effect of Subsidy \*  $Ln\_Size$  on  $Ln\_NAV08$ .

With regard to control variables, we find across models a significant positive effect of  $Ln\_Size$  and a significant negative effect of  $Ln\_Age$ . Additionally, the industry dummies remain jointly significant. R&D intensity is not significant.

**Table 3.** Regression results: environmental innovation motives and firm financial performance (*Ln\_NAV08*) (1761 observations).

	Model 1	Model 2
<i>Environmental innovation motives</i>		
<i>Regulation</i>	0.0605 (0.0423)	−0.1837 (0.1340)
<i>Subsidy</i>	0.0919 * (0.0509)	−0.0415 (0.1592)
<i>Demand</i>	0.0577 (0.0470)	0.3574 ** (0.1474)
<i>Codes</i>	0.0447 (0.0409)	−0.2044 (0.1371)
<i>Ln_Size</i>	1.0047 *** (0.0142)	0.9767 *** (0.0195)
<i>Regulation*Ln_Size</i>		0.0586 * (0.0315)
<i>Subsidy*Ln_Size</i>		0.0281 (0.0355)
<i>Demand*Ln_Size</i>		−0.0708 ** (0.0341)
<i>Codes*Ln_Size</i>		0.0617 * (0.0323)
<i>Ln_Age</i>	−0.0637 *** (0.0206)	−0.0618 *** (0.0204)
<i>RDint</i>	−1.9295 (2.1418)	−1.9459 (2.1369)
<i>Industry dummies</i>	Included ***	Included ***
<i>R<sup>2</sup></i>	0.8295	0.8311

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Robust standard errors in parentheses.

#### 4.2. Robustness Checks

As a robustness check, we divided the sample in a subsample of ‘small’ firms and a subsample of ‘large’ firms. We split the sample on the median value of firm size, representing 37 employees in 2006. This implies that the subsample of ‘large’ firms in fact contains many SMEs. We find that the subsample of ‘large’ firms benefits significantly from the introduction of environmental innovations in response to industry codes of conduct, while the subsample of ‘small’ firms reaps significant benefits from environmental innovations introduced as a response to customer demand. The two subsamples do not show a different effect from introduction of environmental innovations in response to regulation or subsidies. Splitting up the sample at the median hence does not allow to bring out the earlier finding that the effect of regulation-induced environmental innovation differs significantly with firm size. We note, however, that our main analyses using a continuous firm size variable have more statistical power and that split-sample analyses are discouraged for the testing of moderating effects due to the need to artificially dichotomize a continuous variable [61].

In turn, we created subsamples containing the 40%, 30%, and 25% largest and smallest firms in our sample. These analyses show even more pronounced differences between larger and smaller firms when it comes to the effect of environmental innovations in response to industry codes of conduct, and in response to customer demand. When comparing the 25% largest and smallest firms in our sample, we also again find different effects of regulation-induced environmental innovations.

While regulation has a negative (although insignificant) effect for the 25% smallest firms, it has a positive (although insignificant) effect for the 25% largest firms.

Environmental activities were measured in the period 2006–2008 and financial performance was measured in 2008 limiting endogeneity concerns. Nevertheless, endogeneity may arise as past financial performance may affect the engagement in environmental activities. We tried controlling for past performance. However, this led to a dramatic decrease in observations, especially at the low end of the size distribution. The analyses of this reduced sample did not allow us to reproduce the results in Tables 2 and 3. This is no surprise as effects especially appear to differ for the 25% smallest firms. We did find however that the regression results for the firms in the reduced sample were highly similar when either including or excluding past financial performance as a control. This suggests that the relationships we find between environmental innovation and financial performance is not driven by past performance.

Our propositions represent an interaction effect. Some authors [62] have proposed that to avoid multicollinearity, one should z-standardize the variables composing the interaction term. We ran all our models with z-standardized values for *Ln\_Size* and its cross-products with *Regulation*, *Subsidy*, *Demand*, and *Codes*. As the latter four variables were dummy-coded variables, they did not need to be standardized [62]. Z-standardizing did not change any of the results. All signs and significance levels remained the same. All results for robustness checks are available from the authors upon request.

## 5. Discussion

### 5.1. Implications for Research

In light of growing concerns about climate change and sustainable development, understanding when and why firms' environmental innovation impacts their performance is important. It can help to engage more firms in environmental innovation activities and to design policies that support firms in doing so. Recognizing that the benefits of environmental innovation may not be universal and do not hold equally for all firms, a review of the literature on environmental activities and financial performance concludes that the greatest potential for future research in this area lies in identifying contingencies affecting the environmental–financial performance relationship [63]. Our study provides novel insights on such contingencies that advance our understanding of the consequences of environmental innovation for firm performance. Our findings also offer a new perspective to help understand why innovation is not always beneficial for firm performance [7]. Moreover, they reinforce the emerging perspective that small and medium-sized firms (SMEs) can have unique strengths for innovation, which complements the still dominant 'deficit view' of SMEs. We discuss these contributions in more detail after summarizing our findings.

Studying a representative sample of Flemish firms, we first find support for argument that engaging in environmental innovation can enhance firm competitiveness. Second and building on resource and stakeholder theory, we predict and find that the effects of environmental innovations on firms' financial performance are contingent on firm size (more pronounced for larger firms) and that this moderating effect differs depending on why the firm engages in environmental innovations (i.e., the firm's motives). In line with predictions based on resource theory, larger firms benefit more from environmental innovations, and especially when they introduce these innovations in response to regulation or industry codes of conduct. Conversely and in line with predictions from stakeholder theory, smaller firms benefit from introducing environmental innovations in response to customer demand.

These findings imply an important contextualization of the environmental innovation–firm performance relationship. Whereas previous work has distinguished between the effects of regulation-induced and voluntary environmental innovation [45], we demonstrate opposing effects of these two motives for firms of different sizes. Thus, it is essential for future research investigating environmental innovation to consider firm size in combination with firm motives for environmental

innovation. Failure to do so would lead to misleading and wrong conclusions of the effects of regulation-induced and voluntary, customer demand induced environmental innovation, depending on whether the sample of firms under investigation is mainly composed of smaller or larger companies. It may also lead to null effects when the sample is mixed. Moreover, our study highlights that complementary theories help to understand these contingencies.

The resource-based view helps to understand why environmental innovations introduced as a response to regulation have a positive effect for larger firms. This is in line with previous work [10,11], which suggests that larger firms have more resources to adapt to regulation, and are also better placed to lobby and influence regulatory developments and also industry codes of conducts such that they benefit their own requirements. Stakeholder theory helps to understand why smaller firms benefit from environmental innovations introduced as a response to customer demand. Smaller firms are better able to benefit from environmentally conscious niche consumers who are willing to pay more for green products or redirect their demand toward environmentally friendly firms (see [23] on green consumer theory). Our finding is also consistent with arguments that smaller firms are more dependent on local stakeholders [12,13,47], such that the benefits of accommodating their customers through environmental innovations outweighs the financial and resource disadvantages of smaller firms. In line with recent pleas in the literature [6,38], this study hence moves away from the focus of SMEs as reactive entities with disadvantageous characteristics (the ‘deficit view’ of SMEs). Instead it puts forward customer intimacy as a unique advantage supporting successful environmental innovation in smaller firms.

Our results also call for future research to adopt a more fine-grained theoretical distinction between regulation-driven and voluntary environmental innovations. While environmental innovations introduced in response to customer demand are particularly beneficial for smaller firms, environmental innovation introduced because of the availability of subsidies or industry codes of conduct—which are sometimes seen as other categories of ‘voluntary’ environmental innovation—does not favor smaller firms in our sample. Implementing industry codes of conduct benefits larger firms more than smaller firms. This aligns with evidence suggesting that larger firms are better at influencing industry codes—just as they are better at influencing regulatory developments—and that the measures taken in these industry codes accommodate the desires of larger firms but not those of smaller enterprises [64]. Future studies should therefore be careful and make sufficiently detailed distinctions between different types of motives for environmental innovation.

Our findings also contribute to the more general debate about heterogeneity in the innovation–firm performance relationship [7]. For instance, meta-analytic reviews find that the impact of innovation on firm performance is surprisingly small—‘surprising’ in light of the widely held belief that innovation is an essential source of competitive advantage for firms. The findings of our study call for a more differentiated understanding of the boundary conditions of the innovation–performance relationship. Such as contingency perspective challenges researchers to develop more nuanced theoretical predictions that consider the size of the firm and theoretical perspective such as resource-based view or stakeholder theory that align with firm size and highlight the respective strengths of larger and smaller firms for their innovation activities.

## 5.2. Practical and Policy Implications

This study has implications for the environmental strategies of firms. The managers of large firms should reconsider the way they are currently monitoring and reacting to customer demand for environmental innovations. The results of our study suggest that the costs for developing these innovations are—at least in the short term—not outweighed by their benefits. They should give priority to environmental innovations that meet regulation or voluntary codes of conduct in the industry. Moreover, they should try to influence these regulations and voluntary codes of conduct to advance novel ways of working that fit their internal knowledge and resources in terms of environmental innovation. Small firms’ managers, on the other hand, should critically reflect on their engagement

in such industry codes of conduct, as these codes do not seem advantageous to them. Additionally, they should think twice before developing environmental innovations simply because subsidies are available to do so. As our analyses show no significant impact of subsidy-induced environmental innovations in smaller firms, a thorough case-by-case financial analysis on their side is needed to verify whether these subsidies actually outweigh the costs involved in developing the innovation. On the other hand, the management of smaller firms should pay close attention to the needs and opinions of their customers. They are crucial for small firm survival and performance, and satisfying them with new, environmentally friendly products or services, will positively affect financial performance.

Our findings also have important policy implications, as they imply that environmental policies should be tailored to specific subgroups of companies. Policy makers cannot assume that one type of policies fits firms of all sizes, but should consider adapting policies to firm size. While regulatory initiatives may be appropriate for larger companies, government initiative to raise customer awareness regarding environmental issues may be an indirect, but more adequate approach to stimulating environmental innovation in smaller firms. In addition, our findings provide only partial support for government policies fostering voluntary industry initiatives [65,66], as these appear to benefit only larger firms.

## 6. Limitations and Suggestions for Future Research

In spite of its conceptual and empirical contribution, the current study has several limitations. First, it operationalizes voluntary and regulation-driven environmental innovations in a rather general way. Previous studies suggest that the effect of environmental innovations may depend (a) on the design of environmental regulations, and in particular on whether or not they are preventative and prescribe a specific technology [27], (b) on the monitoring regimes of voluntary environmental programs [65], (c) on the specific type of environmental innovations (e.g., product design versus production versus logistics [67], pollution prevention versus product stewardship versus sustainable development [36], innovations that directly reduce the focal firm's resource consumption versus innovations that only reduce environmental externalities without increasing resource efficiency [45,68]), and (d) on how advanced the firm is in terms of environmental responsibility [69,70]. Our survey measures do not allow us to make these detailed distinctions, and we hope that future studies will be able to provide a more nuanced view in this respect.

Second, previous research doubts whether the positive effects of environmental innovations for firm performance will persist once they are adopted throughout a sector [69]. Contrary to earlier studies which observe a strong time variation in the valuation of environmentally efficient firms [71], this study is unable to evaluate whether the relation between environmental innovation and firm performance changes over time. Future research would benefit from panel studies allowing to evaluate such changes and considering past financial performance. Such an approach would also allow to make stronger causal claims than our current study.

Third, given the limitations of the survey data and the limited information available in annual accounts of small firms, the current study was restricted in the number of control variables used. We suggest future studies to include more and more detailed information on, for example, marketing expenditures and slack resources when studying the effect of environmental innovation on financial performance in small and large firms.

Finally, this study focuses on the environmental innovation activities of Flemish firms. As the economic consequences of environmental actions depend on the country in which a firm is located [72], we hope that future studies will try to replicate our findings in other regions and countries in order to test their generalizability.

## 7. Conclusions

We feel this study was able to generate important novel insights and implications. Building on the resource-based view of the firm and on stakeholder theory, and using survey and lagged



annual account data on 1775 Flemish firms, this paper studies whether the effects of environmental actions—and in particular of environmental innovation—on firms' financial performance depend on the motives driving these environmental actions; and whether these contingencies are different for SMEs and large firms. We find that the moderating effects of whether environmental innovations are developed as a response to customer demand, to regulation, to the availability of subsidies, or to codes of conduct in the industry, depend on firm size. These findings extend existing work by highlighting key boundary conditions of the relationship between environmental innovation and financial performance. Our findings also contribute to a debate in the more general innovation literature, which finds evidence for considerable heterogeneity in the innovation–firm performance relationship and calls for a more differentiated understanding of the boundary conditions of this relationship [7,73]. In addition, our study is one of the first to explicitly disentangle the effects of various voluntary and regulation-driven environmental innovations thereby avoiding omitted variable bias, and allowing for a more detailed and correct understanding of the role of firm size and firm motives—as well as having important implications for practitioners and policy-makers.

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**Conflicts of Interest:** The authors declare no conflicts of interest.

## Appendix A

Sector	NACE Codes	Number of Observations
Tobacco, food	10–12	151 (8.6%)
Textile, clothing, leather	13–15	68 (3.9%)
Wood, paper, publishing	16–18	66 (3.7%)
Pharmaceuticals, chemicals, plastics	19–22	156 (8.9%)
Metal	24, 25	161 (9.1%)
ICT, electronics	26, 27	66 (3.7%)
Machinery, vehicles	28–30	166 (9.4%)
Other industries	8, 23, 31–39	189 (10.7%)
Wholesale trade	46	245 (13.9%)
ICT and R&D services	61–63, 71, 72	246 (14.0%)
Other services	49–53, 58, 64–66	247 (14.0%)
<b>Total</b>		<b>1761 (100%)</b>

## References

1. Orlitzky, M.; Schmidt, F.L.; Rynes, S.L. Corporate social and financial performance: A meta-analysis. *Organ. Stud.* **2003**, *24*, 403–441. [[CrossRef](#)]
2. Merrit, J.Q. EM into SME won't go? Attitudes, awareness and practices in the London borough of Croydon. *Bus. Strategy Environ.* **1998**, *7*, 90–100. [[CrossRef](#)]
3. Etzion, D. Research on organizations and the natural environment, 1992–present: A review. *J. Manag.* **2007**, *33*, 637–664. [[CrossRef](#)]

4. Petts, J.; Herd, A.; Gerrard, S.; Horne, C. The climate and culture of environmental compliance within SMEs. *Bus. Strategy Environ.* **1999**, *8*, 14–30. [[CrossRef](#)]
5. Revell, A.; Blackburn, R. The business case for sustainability? An examination of small firms in the UK's construction and restaurant sectors. *Bus. Strategy Environ.* **2004**, *16*, 404–420. [[CrossRef](#)]
6. Aragón-Correa, J.A.; Hurtado-Torres, N.; Sharma, S.; García-Morales, V. Environmental strategy and performance in small firms: A resource-based perspective. *J. Environ. Manag.* **2008**, *86*, 88–103. [[CrossRef](#)] [[PubMed](#)]
7. Rosenbusch, N.; Brinckmann, J.; Bausch, A. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *J. Bus. Ventur.* **2011**, *26*, 441–457. [[CrossRef](#)]
8. Wernerfelt, B. A resource-based view of the firm. *Strateg. Manag. J.* **1984**, *5*, 171–180. [[CrossRef](#)]
9. Barney, J.B. Firm resources and sustained competitive advantage. *J. Manag.* **1991**, *17*, 99–120. [[CrossRef](#)]
10. Chilton, K.W.; Weidenbaum, M.L. Government regulation: The small business burden. *J. Small Bus. Manag.* **1982**, *20*, 4–10.
11. Bartel, A.P.; Thomas, L.G. Predation through Regulation: The Wage and Profit Effects of the Occupational Safety and Health Administration and the Environmental Protection Agency. *J. Law Econ.* **1987**, *30*, 239–264. [[CrossRef](#)]
12. Besser, T.L. Community involvement and the perception of success among small business operators in small towns. *J. Small Bus. Manag.* **1999**, *37*, 16–29.
13. Perrini, F. SMEs and CSR theory: Evidence and implications from an Italian perspective. *J. Bus. Ethics* **2006**, *67*, 305–316. [[CrossRef](#)]
14. Blanco, E.; Rey-Maqueira, J.; Lozano, J. The economic impacts of voluntary environmental performance of firms: A critical review. *J. Econ. Surv.* **2009**, *23*, 462–503. [[CrossRef](#)]
15. Brännlund, R.; Lundgren, T. Environmental policy without costs? A review of the Porter hypothesis. *Int. Rev. Environ. Resour. Econ.* **2009**, *3*, 75–117. [[CrossRef](#)]
16. Redmond, J.; Walker, E.; Wang, C. Issues for small businesses with waste management. *J. Environ. Manag.* **2008**, *88*, 275–285. [[CrossRef](#)] [[PubMed](#)]
17. Jennings, P.; Beaver, G. The performance and competitive advantage of small firms: A management perspective. *Int. Small Bus. J.* **1997**, *15*, 63–75. [[CrossRef](#)]
18. Becker, R.A.; Pasurka, C.J.; Shadbegian, R.J. Do environmental regulations disproportionately affect small businesses? Evidence from the pollution abatement costs and expenditures survey. *J. Environ. Econ. Manag.* **2013**, *66*, 523–538. [[CrossRef](#)]
19. Worthington, I.; Patton, D. Strategic intent in the management of the green environment within SMEs. *Long Range Plan.* **2005**, *38*, 197–212. [[CrossRef](#)]
20. Choi, J.Y.; Han, D.B. The links between environmental innovation and environmental performance: Evidence for high- and middle-income countries. *Sustainability* **2018**, *10*, 2157. [[CrossRef](#)]
21. Carrión-Flores, C.E.; Innes, R. Environmental innovation and environmental performance. *J. Environ. Econ. Manag.* **2010**, *59*, 27–42. [[CrossRef](#)]
22. Beise, M.; Rennings, K. Lead markets and regulation: A framework for analyzing the international diffusion of environmental innovations. *Ecol. Econ.* **2005**, *52*, 5–17. [[CrossRef](#)]
23. Wu, J.J. Environmental compliance: The good, the bad, and the super green. *J. Environ. Manag.* **2009**, *90*, 3363–3381. [[CrossRef](#)] [[PubMed](#)]
24. Bowen, F.E. Environmental visibility: A trigger of green organizational response? *Bus. Strategy Environ.* **2000**, *9*, 92–107. [[CrossRef](#)]
25. Palmer, K.; Oates, W.E.; Portney, P.R. Tightening environmental standards: The benefit-cost or the no-cost paradigm? *J. Econ. Perspect.* **1995**, *9*, 119–132. [[CrossRef](#)]
26. Christainsen, G.; Tietenberg, T.H. Distributional and macro-economic aspects of environmental policy. In *Handbook of Natural Resource and Energy Economics*; Kneese, A., Sweeney, J., Eds.; Elsevier Science Publishers: Amsterdam, The Netherlands, 1985; Volume 1.
27. Porter, M.E. America's green strategy. *Sci. Am.* **1991**, *254*, 168. [[CrossRef](#)]
28. Porter, M.E.; van der Linde, C. Towards a new conception of the environment-competitiveness relationship. *J. Econ. Perspect.* **1995**, *9*, 97–118. [[CrossRef](#)]

29. Guo, Y.; Wang, L.; Wang, M.; Zhang, X. The mediating role of environmental innovation on knowledge acquisition and corporate performance relationship—A study of SMEs in China. *Sustainability* **2019**, *11*, 2315. [\[CrossRef\]](#)
30. Hart, S.L. A natural-resource-based view of the firm. *Acad. Manag. Rev.* **1995**, *20*, 986–1014. [\[CrossRef\]](#)
31. Jaffe, A.B.; Palmer, K. Environmental regulation and innovation: A panel data study. *Rev. Econ. Stat.* **1997**, *79*, 610–619. [\[CrossRef\]](#)
32. Khanna, M. Non-mandatory approaches to environmental protection. *J. Econ. Surv.* **2001**, *15*, 291–324. [\[CrossRef\]](#)
33. Konar, S.; Cohen, M.A. Does the market value environmental performance? *Rev. Econ. Stat.* **2001**, *83*, 281–289. [\[CrossRef\]](#)
34. Murty, M.N.; Kumar, S. Win-win opportunities and environmental regulation: Testing of Porter hypothesis for Indian manufacturing industries. *J. Environ. Manag.* **2003**, *67*, 139–144. [\[CrossRef\]](#)
35. Yang, M.G.; Hong, P.; Modi, S.B. Impact of lean manufacturing and environmental management on business performance: An empirical study of manufacturing firms. *Int. J. Prod. Econ.* **2011**, *129*, 251–261. [\[CrossRef\]](#)
36. Hart, S.L.; Dowell, G. Invited Editorial: A natural-resource-based view of the firm: Fifteen years after. *J. Manag.* **2011**, *37*, 1464–1479. [\[CrossRef\]](#)
37. Noci, G.; Verganti, R. Managing ‘green’ product innovation in small firms. *R D Manag.* **1999**, *29*, 3–15. [\[CrossRef\]](#)
38. Klewitz, J.; Hansen, E.G. Sustainability-oriented innovation of SMEs: A systematic review. *J. Clean. Prod.* **2014**, *65*, 57–75. [\[CrossRef\]](#)
39. Russo, M.; Fouts, P. A resource-based perspective on corporate environmental performance and profitability. *Acad. Manag. J.* **1997**, *40*, 534–559.
40. Cloquell-Ballester, V.A.; Monterde-Díaz, R.; Cloquell-Ballester, V.A.; Torres-Sibille, A. Environmental education for small- and medium-sized enterprises: Methodology and e-learning experience in the Valencian region. *J. Environ. Manag.* **2008**, *87*, 507–520. [\[CrossRef\]](#)
41. Wills, I. Informational barriers to pollution reduction in small business. *Econ. Soc. Aust.* **2003**, *22*, 84–95.
42. Hillary, R. *Small and Medium-Sized Enterprises and the Environment*; Greenleaf: Sheffield, UK, 2000.
43. Horbach, J. Determinants of environmental innovation—New evidence from German panel data sources. *Res. Policy* **2008**, *37*, 163–173. [\[CrossRef\]](#)
44. Kesidou, E.; Demirel, P. On the drivers of eco-innovations: Empirical evidence from the UK. *Res. Policy* **2012**, *41*, 862–870. [\[CrossRef\]](#)
45. Rexhäuser, S.; Rammer, C. Environmental innovations and firm profitability: Unmasking the Porter hypothesis. *Environ. Resour. Econ.* **2014**, *57*, 145–167. [\[CrossRef\]](#)
46. Jiang, Y.; Xue, X.; Xue, W. Proactive corporate environmental responsibility and financial performance: Evidence from Chinese energy enterprises. *Sustainability* **2018**, *10*, 964. [\[CrossRef\]](#)
47. Darnall, N.; Henriques, I.; Sadorsky, P. Adopting proactive environmental strategy: The influence of stakeholders and firm size. *J. Manag. Stud.* **2010**, *47*, 1072–1094. [\[CrossRef\]](#)
48. Donaldson, T.; Preston, L. The stakeholder theory of the corporation: Concepts, evidence, and implications. *Acad. Manag. Rev.* **1995**, *21*, 65–91. [\[CrossRef\]](#)
49. Freeman, R.E. *Strategic Management: A Stakeholder Approach*; Pitman: Boston, MA, USA, 1984.
50. Riahi-Belkaoui, A. *Value Added Reporting: Lessons from the United States*; Quorum Books: Westport, CT, USA, 1992.
51. Vanacker, T.; Manigart, S.; Meuleman, M.; Sels, L. A longitudinal study on the relationship between financial bootstrapping and new venture growth. *Entrep. Reg. Dev.* **2011**, *23*, 681–705. [\[CrossRef\]](#)
52. Delmar, F.; Davidsson, P.; Gartner, W.B. Arriving at the high-growth firm. *J. Bus. Ventur.* **2003**, *18*, 189–216. [\[CrossRef\]](#)
53. Liu, C.-C.; Yu, Y.-H.; Wernick, I.K.; Chang, C.-Y. Using the electronic industry code of conduct to evaluate green supply chain management: An empirical study of Taiwan’s computer industry. *Sustainability* **2015**, *7*, 2787–2803. [\[CrossRef\]](#)
54. Carrión-Flores, C.E.; Innes, R.; Sam, A.G. Do voluntary pollution reduction programs (VPRs) spur or deter environmental innovation? Evidence from 33/50. *J. Environ. Econ. Manag.* **2013**, *66*, 444–459. [\[CrossRef\]](#)
55. Singh, J.V.; Lumsden, C.J. Theory and research in organizational ecology. *Annu. Rev. Sociol.* **1990**, *16*, 161–195. [\[CrossRef\]](#)

56. Barron, D.N.; West, E.; Hannan, M.T. A time to grow and a time to die: Growth and mortality of credit unions in New York City, 1914–1990. *Am. J. Sociol.* **1994**, *100*, 381–421. [[CrossRef](#)]
57. Hite, J.M.; Hesterly, W.S. The evolution of firm networks: From emergence to early growth of the firm. *Strateg. Manag. J.* **2001**, *22*, 275–286. [[CrossRef](#)]
58. Eisenhardt, K.M.; Schoonhoven, C. Organisational growth: Linking founding team, strategy, environment, and growth among U.S. Semiconductor Ventures, 1987–1988. *Adm. Sci. Q.* **1990**, *35*, 504–529. [[CrossRef](#)]
59. McWilliams, A.; Siegel, D. Corporate social responsibility and financial performance: Correlation or misspecification. *Strateg. Manag. J.* **2000**, *21*, 603–609. [[CrossRef](#)]
60. King, A.; Lenox, M. Does it really pay to be green? An empirical study of firm environmental and financial performance. *J. Environ. Econ. Manag.* **2001**, *36*, 243–266.
61. Dawson, J.F. Moderation in management research: What, why, when, and how. *J. Bus. Psychol.* **2014**, *29*, 1–9. [[CrossRef](#)]
62. Frazier, P.A.; Tix, A.P.; Barron, K.E. Testing moderator and mediator effects in counseling psychology. *J. Couns. Psychol.* **2004**, *51*, 115–134. [[CrossRef](#)]
63. Berchicci, L.; King, A. Postcards from the edge: A review of the business and environment literature. *Acad. Manag. Perspect.* **2007**, *1*, 1513–1547.
64. Hill, M.D.; Kelly, G.W.; Lockhart, G.B.; van Ness, R.A. Determinants and effects of corporate lobbying. *Financ. Manag.* **2013**, *42*, 931–957. [[CrossRef](#)]
65. Darnall, N.; Sides, S. Assessing the performance of voluntary environmental programs: Does certification matter? *Policy Stud. J.* **2008**, *36*, 95–117. [[CrossRef](#)]
66. Nishitani, K.; Kaneko, S.; Fujii, H.; Komatsu, S. Are firms' voluntary environmental management activities beneficial for the environment and business? An empirical study focusing on Japanese manufacturing firms. *J. Environ. Manag.* **2012**, *105*, 121–130. [[CrossRef](#)] [[PubMed](#)]
67. González-Benito, J.; González-Benito, O. Environmental proactivity and business performance: An empirical analysis. *Omega* **2005**, *33*, 1–15. [[CrossRef](#)]
68. Ghisetti, C.; Rennings, K. Environmental innovations and profitability: How does it pay to be green? An empirical analysis on the German innovation survey. *J. Clean. Prod.* **2014**, *75*, 106–117. [[CrossRef](#)]
69. Hart, S.; Ahuja, G. Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. *Bus. Strategy Environ.* **1996**, *5*, 30–37. [[CrossRef](#)]
70. Nehrt, C. Timing and intensity effects of environmental investments. *Strateg. Manag. J.* **1996**, *17*, 535–547. [[CrossRef](#)]
71. Guenster, N.; Bauer, R.; Derwall, J.; Koedijk, K. The economic value of corporate eco-efficiency. *Eur. Financ. Manag.* **2011**, *17*, 679–704. [[CrossRef](#)]
72. Wagner, M.; Van Phu, N.; Azomahou, T.; Wehrmeyer, W. The relationship between the environmental and economic performance of firms: An empirical analysis of the European paper industry. *Corp. Soc. Responsib. Environ. Manag.* **2002**, *9*, 133–146. [[CrossRef](#)]
73. Rubera, G.; Kirca, A.H. Firm Innovativeness and Its Performance Outcomes: A Meta-Analytic Review and Theoretical Integration. *J. Mark.* **2012**, *76*, 130–147. [[CrossRef](#)]

